



IMPLEMENT UNIT HAZARDOUS MATERIALS MANAGEMENT

TSP 05-2-7503

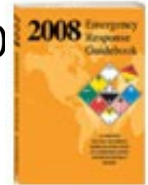
Learning Objective 1

- Identify hazardous materials management techniques.



References

- AR 700-141, Hazardous Materials Information Resource System, 13 Aug 2007
- AR 702-18, Material Quality Control Storage Standards Policy for Shelf-Life Materiel, 3Oct04
- FM 3-34.5, Environmental Considerations, Feb 2010
- FM 3-35, Army Deployment and Redeployment, 21 April 2010
- TM 38-410, Storage and Handling of Hazardous Materials, 13 Jan 1999
- TM 38-250, Preparing Hazardous Materials for Military Air Shipments, 1 Sep 2009
- TC 3-34.489, The Soldier and the Environment, 8 May 2001
- TG 217, Hazardous Material/Hazardous Waste Management Guidance for Maneuver Units During Field and Deployment Operations, Oct 2000
- DOD Manual 4140.27-M, Shelf-Life Item Management Manual, 5 May 20
- UFC 4-442-01N, Design: Covered Storage, 16 Jan 2004
- DLA Customer Handbook, 2007
- NIOSH Pocket Guide to Hazardous Chemicals, <http://www.cdc.gov/niosh/npg/>
- Fire Protection Guide on Hazardous Materials, The National Fire Protection Association, 2001
- Emergency Response Guidebook, DOT, 2008
- Hazardous Materials Emergency Planning Guide, National Response Team. 2001
- CFR 49, Parts 100-185, Department of Transportation Regulations
- CFR 29, Parts 1910, Occupational Safety and Health Standards
- CFR 40, Protection of Environment
- EPA and DOT websites



Training Applicability

The key personnel who have responsibility for unit hazardous materials management are:

- The Supply Sergeant
- The Motor Sergeant
- Safety OFF/NCO
- The CBRN OFF/NCO
- The Repair and Utility (R&U) Person
- All users, handlers and transporters

Hazardous Material

Any material, including waste, that may pose an unreasonable risk to health, safety, property, or the environment.



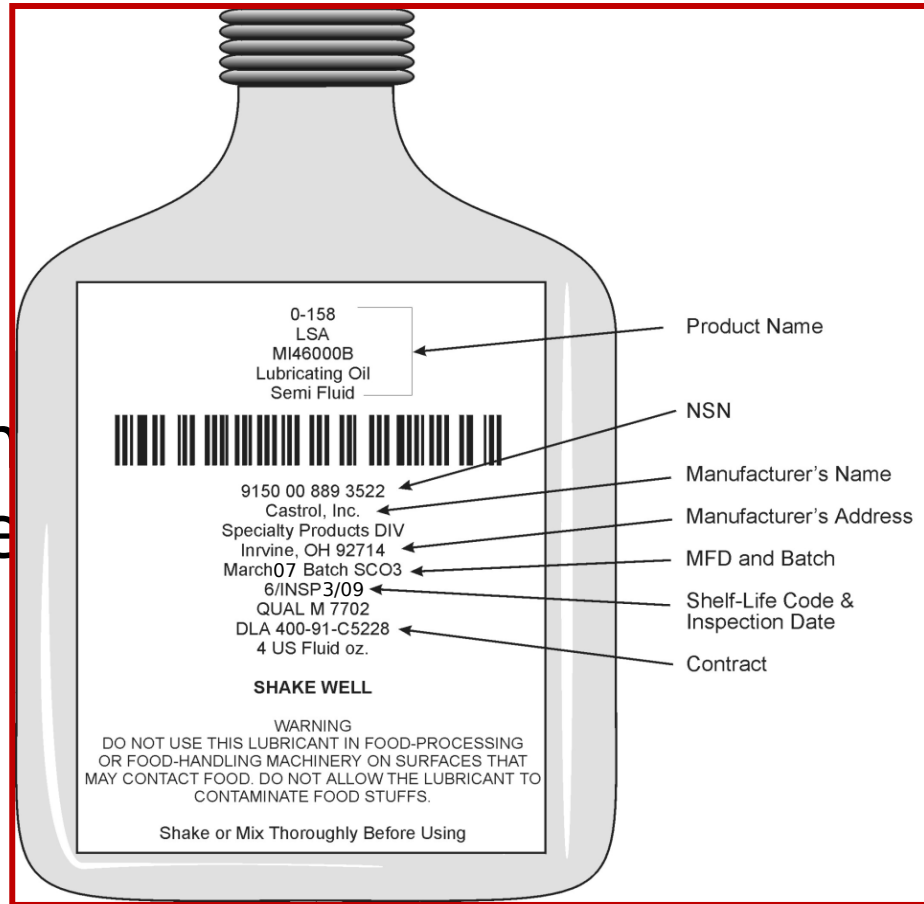
Common Hazardous Materials

- Alcohol
- Antifreeze
- Batteries
- Paint
- Solvent
- Cleaning supplies
- Fuel
- Super Tropical Bleach
- Field sanitation kits
- Fuel antifreeze



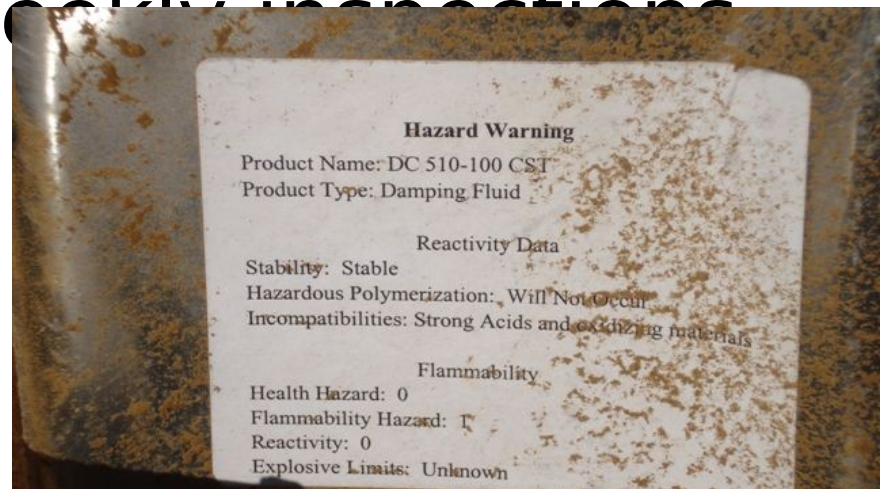
Labels

- Legible
- Should include:
 - Product Name
 - Manufacturer's Name and Address
 - OSHA Warning
- DLA product
 - NSN
 - Manufacture Date and Batch Number
 - Shelf-Life Code and Inspection Date
 - Contract Number



Replacement Labeling

- Replace labels that are missing, illegible or damaged
- Include product name, NSN, and OSHA warning
- Check labels when conducting inventories and weekly inspections



Material Safety Data Sheets

Every hazardous material in inventory will have a

Material Safety Data Sheet (MSDS).

If a
MSDS is missing:

MATERIAL SAFETY DATA SHEET		
SECTION 1		NAME & PRODUCT
Chemical Name: Acrylonitrile		Catalog Number: AX0550
Trade Name & Synonyms: Vinyl Cyanide	CAS #107-13-1	Chemical Family: Nitrile
Formula: CH ₂ :CHCN		Formula Weight: 53.07

- Check the DOD Hazardous Material Information Resource System (HMIRS) at <http://www.dlis.dla.mil/hmirs/>
- Check with supply, chain of command, local or MACOM environmental office or safety officer
- Call the manufacturer or check their website

Personal Protective and Safety Equipment

- Use the MSDS or manufacturer's recommendations for safety and personal protective equipment (PPE)
- Inspect, maintain and replace PPE and safety equipment as needed
- Ensure Soldiers are wearing their PPE and using safety equipment
 - Adequate ventilation
 - Grounding devices
 - Self-closing drum funnels



Spill and Emergency Equipment

- Spill kits, PPE and supplies/equipment needed to control and clean up any HAZMAT spill
- Site/Facility emergency equipment
 - Fire extinguishers
 - Eye Wash Station
 - Emergency Showers
 - Fire containment systems
 - Communication system
 - Basic non-sparking (such as bells, horns, etc.)
 - Radios (universal channels for response personnel)



Managing HAZMAT Inventories

- Reduce: Use non-hazardous substitutes when possible
- Check the HAZMART before requesting more HAZMAT
- Maintain an inventory list
- Set High/Low limits
- Do not stockpile
- Follow first in, first out rule
- Implement a shelf-life program



General Rules for HAZMAT Storage

- Consolidate bulk storage of HAZMAT
- Store hazmat inside protected from the weather
- Coordinate with Safety Officer for locations
 - At least 100m downwind/gradient from billeting and DFACs
- Store flammable and reactive materials according to regulations away from the property line
- Prevent spills and incidents
 - Segregate incompatibles
 - Ensure secondary containment
 - Cover/close floor drains
 - Stock PPE/Emergency and Safety equipment
 - Post appropriate signage

General Rules for HAZMAT Storage (cont'd)

- Secure/limit access
- Establish cover/ventilation
- Maintain an inventory list
- Inspect storage area weekly



Storage Compatibility

If you don't know what category your HAZMAT falls under, look at the MSDS for the Hazardous Characteristic Code (HCC). You can also:

- Determine segregation of HAZMAT using
 - DOT label
 - Precautionary label
 - DLA by-name list
 - DOT Class/Division placard or label

HCC: G2

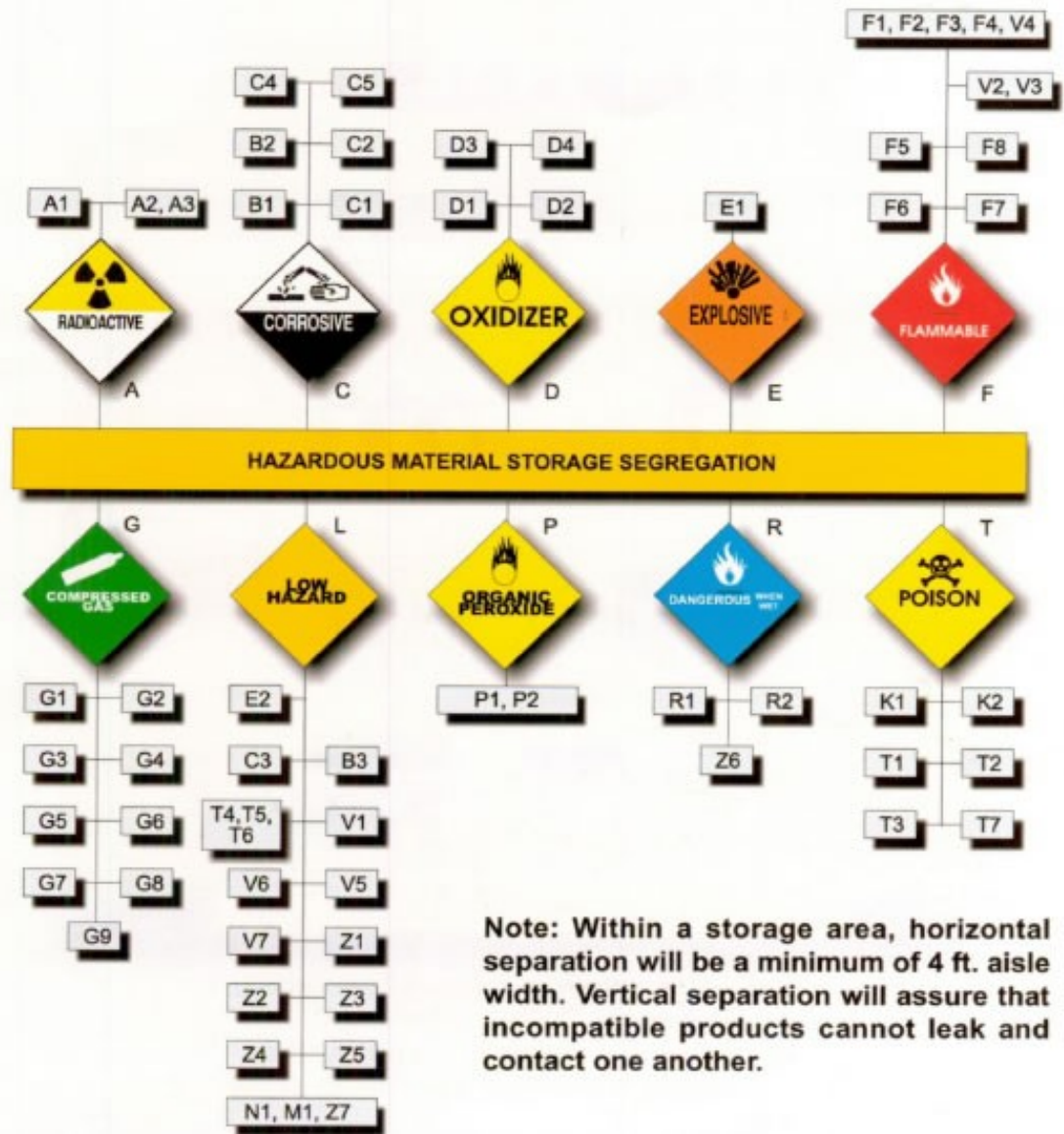


DANGER

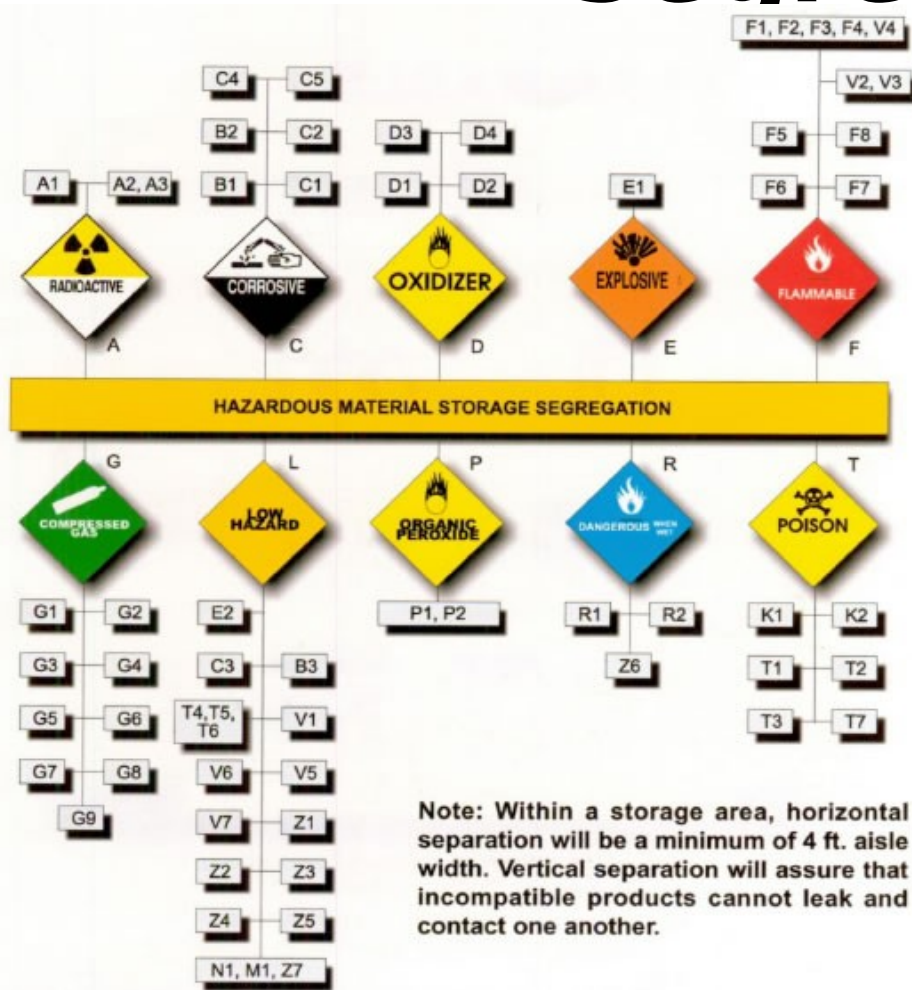


Primary & Secondary Storage Segregation

- 63 Hazardous Characteristic Codes
- Some items in a primary segregation area should be separated by at least 4 feet into secondary segregation



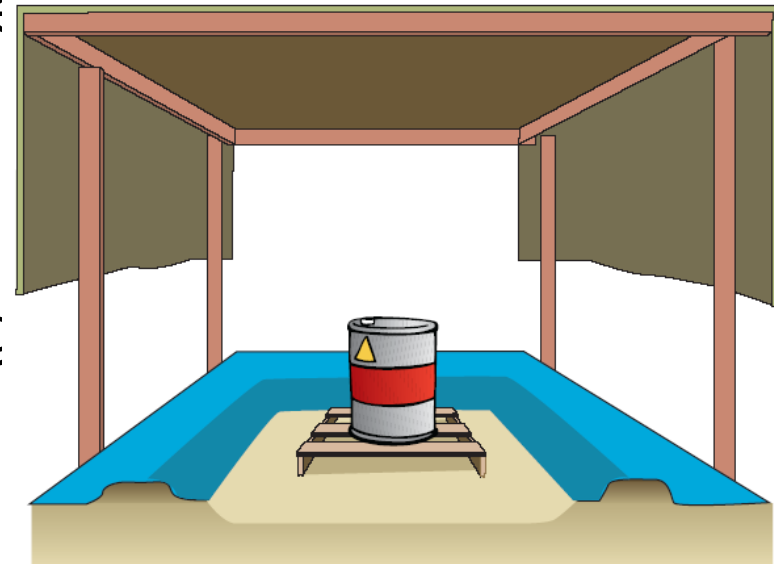
Example Of HCC Segregation



HM Name	HCC
Damping Fluid	V5
Decontamination Solution 2 (DS2)	B2
Silicone Brake Fluid	V5
Super Tropical Bleach	D1
Methyl Ethyl Ketone (MEK)	F2

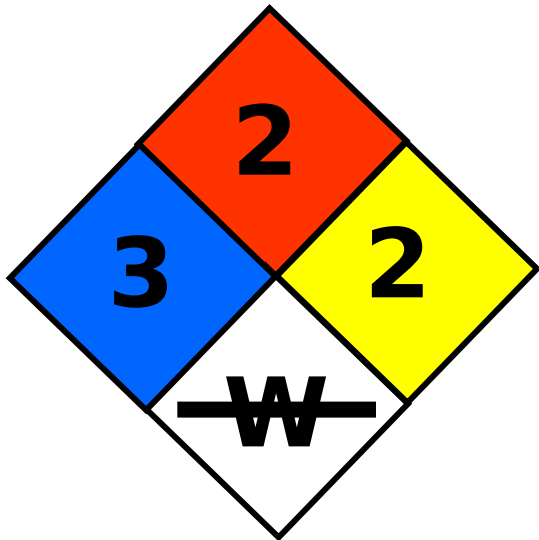
Secondary Containment

- All HAZMAT must have secondary containment
 - An area or container designed to catch spills, drips and leaks
 - This containment area prevents leaks from ever reaching soil or water
- Ensure that the secondary containment
 - Can hold 10% of the total HAZMAT/HW stored or 110% of the container
 - Has an overhead cover to prevent rainwater from collecting or pooling



Signage

- Identification of HAZMAT storage site
 - POC and Emergency number(s)
- No Smoking sign
- NFPA Fire Diamond



Storage Options

- Storage lockers:

- Used in the work area to store daily amounts of commonly used hazardous materials such as oil cans and aerosol cans
- Locker color should coordinate with the hazard of the materials stored:

Yellow = flammables, **Blue** = corrosives

Red = oxidizers

- Storage structures

- Used for bulk storage
- Good housekeeping is key
- Ensure secure and limited access

- Storage racks

- Do not store more than two high
- Keep bungs closed when not in use
- For long-term storage, keep bungs at horizontal axis to reduce leakage potential



Empty Containers

- A container is empty if all products have been removed using commonly employed practices;
- No more than 2.5 cm (1 inch) of residue or 3% by weight of the total capacity of the container remains if it is greater than 110 gallons in size.
- A compressed gas container is empty when the pressure approaches atmospheric.
- As containers empty:
 - Remove or paint over old markings and labels
 - Accumulate a corresponding hazardous waste in them.
 - Turn them in or recycle according to the SOP.

HAZMAT Inspections

- Ensure labels are legible
- Ensure lids are closed/tight
- Ensure containers are marked, labeled and visible to the obs
- Ensure adequate secondary containment
- Ensure container integrity
 - No bulging, corrosion, cracks, etc.
- Manage shelf life date expirations/extensions
- Ensure aisle space for large storage areas
- Ensure fire extinguishers are properly placed and accessible
- Ensure the area is secured



HAZMART Participation

A HAZMART on a CONUS or OCONUS installation is a HAZMAT pharmacy program that tracks the issue and use of HAZMAT. The program is used to:

- Reduce unit level on-site HAZMAT storage requirements
- Track HAZMAT quantities used
- Allow for the turn-in of useable HAZMAT which may then be reissued at no cost to another activity that can use it for its intended purpose

Managing HAZMAT at a Base Camp

- Encourage use of non-hazardous substitutes when possible
- Establish a base camp HAZMART
- Request units send in HAZMAT inventory lists with High/Low quantities based on location to help with emergencies
- Ask for inspection reports and set up Corrective Action Status checks
- Ensure units have adequate secondary containment and segregation
- Ensure units clearly mark HAZMAT storage sites with appropriate signage
 - NFPA diamonds
 - No smoking

HAZMAT Considerations for Deployment

- In a new Theater of Operations, supply chains may not be established
- Units might bring in 3-4 months worth of HAZMAT
- Consider additional resource requirements to accommodate 3-4 months of supplies
 - Storage areas
 - Waste accumulation areas
 - PPE, spill and emergency equipment

HAZMAT Preparation for Redeployment/Closure

- Dispensation of HAZMAT will be a requirement for redeployment or base camp closure.
 - Useable hazardous materials should be turned in to the HAZMART for redistribution.
 - Turned in to the DRMO for redistribution or resale.
 - Packaged up and properly certified for transportation back to the unit's home station.
- If the HAZMAT are not useable they will be

HAZMAT Management Summary

- Promote use of non-hazardous products
- Establish HAZMARTs
- Maintain inventory lists
- Required and Best Management Practices
 - MSDSs
 - Secondary Containment
 - PPE and response equipment
 - First In, First Out/Shelf life management
- Routine inspections
- Timely corrective actions

Check On Learning

- What is a hazardous material?
- Is it permitted to store MOGAS and Battery Acid in the same secondary containment?

Check On Learning

- What is the primary reference for storing and handling hazardous materials?
- How much hazardous materials should a unit plan to have on hand during the establishment of a new base camp?

Learning Objective 2

- Identify the procedures for managing HAZMAT using the Shelf-Life Program.

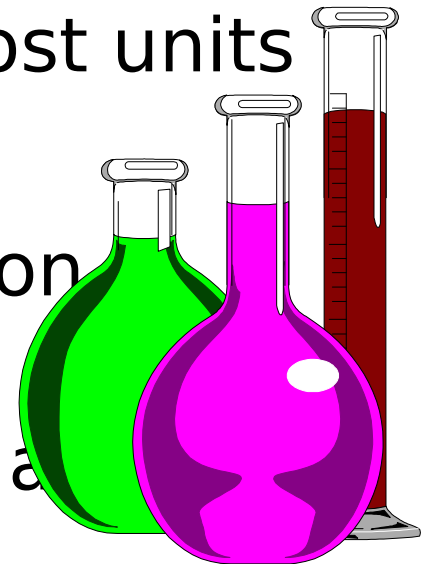


Managing Shelf-Life

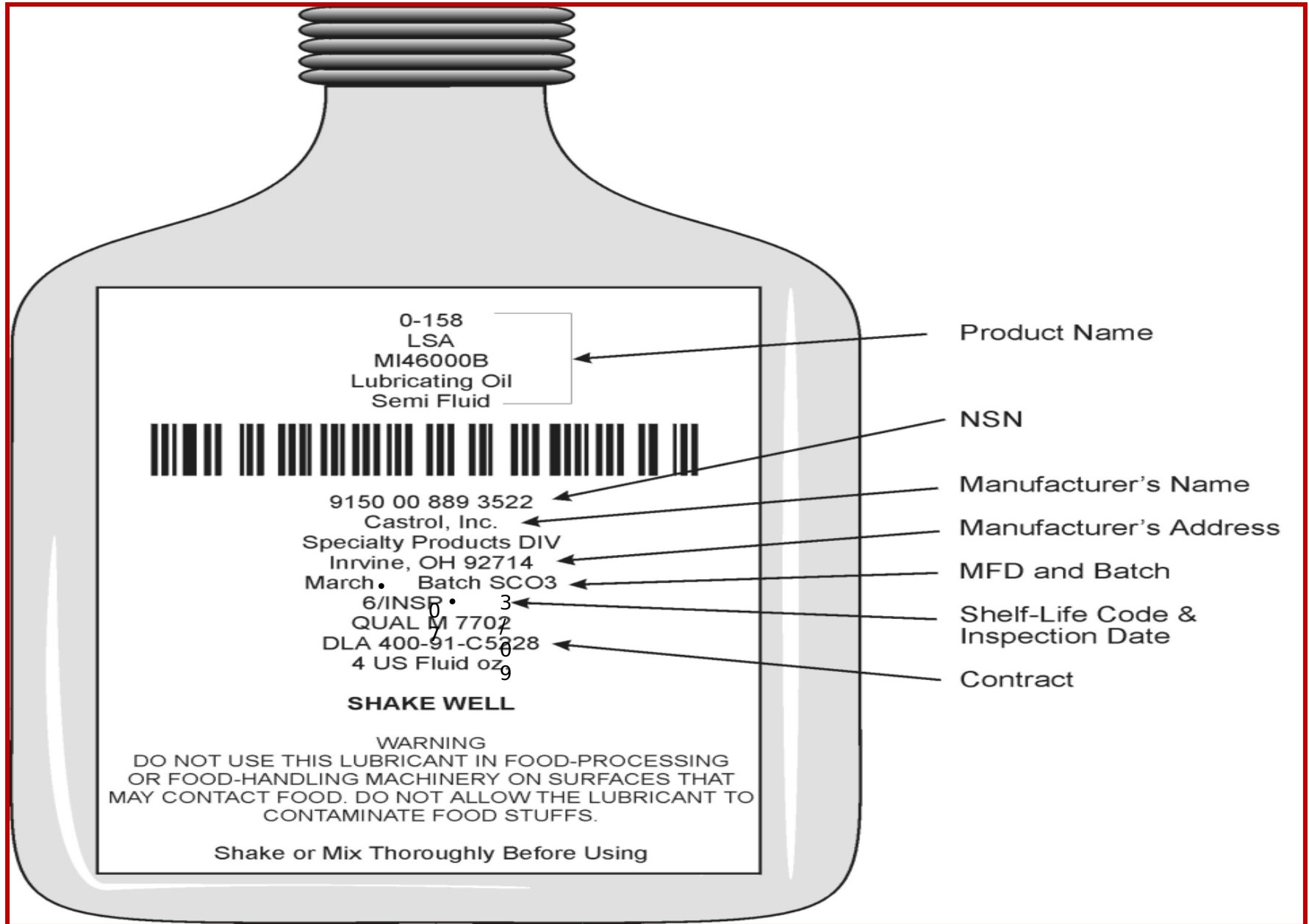
- Shelf-life is the time a product remains useful for the user
- A shelf-life item is a supply item that may deteriorate over time
- At the unit level, the DoD Shelf-Life Program has two purposes:
 - Maintain high quality HAZMAT ready for use
 - Reduce waste generated from expired hazardous materials

Types of Shelf-Life Items

- Two types, Type I and Type II
- Type I are not extendible
 - Designated by an alphabetic code on the label
 - Exception for some medical or NBC Type I items, which are extendable
 - Type I items are very rare at most units
- Type II are extendible
 - Designated by a numeric code on the label
 - Most Type II items marked with a test or inspection date



Typical DLA Product Label

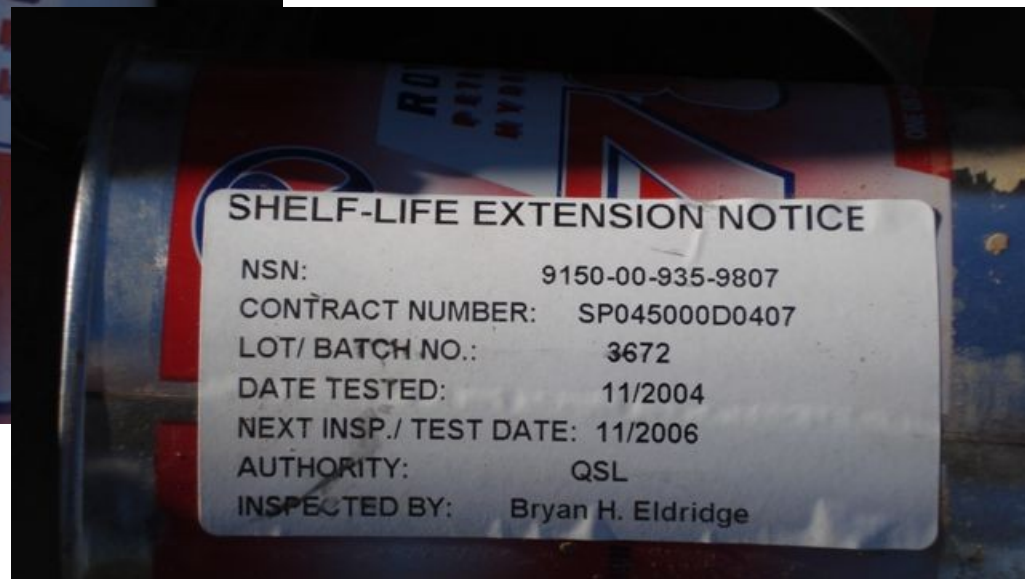


Extension Requirements

- The Military Quality Control Storage Standard (MQCSS) provides information on what type(s) of inspection(s) is (are) required.
- The Quality Status Listing (QSL) provides existing laboratory analysis data for hazardous chemicals and states whether it is still useable or must be disposed of



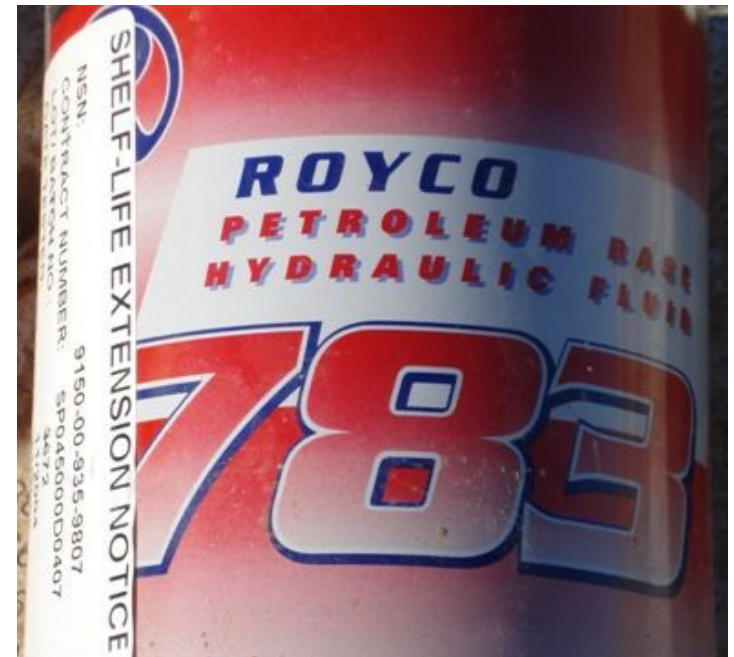
Shelf-Life Example



<https://headquarters.dla.mil/j-3/shelflife/>

Visual Inspection

- Is the container in good condition?
 - Legible label
 - No corrosion or rust
 - Good integrity - no cracks, pits, or other signs of deterioration



DLA Shelf-Life Website

DoD Shelf-Life Program Intranet - Windows Internet Explorer provided by NEC, Fort Leonard Wood, MO

https://headquarters.dla.mil/j-3/shelflife/

DoD Shelf-Life Program Intranet

DEPARTMENT OF DEFENSE
SHELF-LIFE PROGRAM INTRANET

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Welcome to the new Shelf-Life Intranet!

Here are some of the new features:

- ✓ [MQCSS / QSL search pages](#) now with FLIS, JEAP & JACKS data
- ✓ [New MQCSS and QSL administration pages](#)

We are always looking for ways to improve so [let us know what you think!](#)

What is Shelf-Life?

Shelf-Life is the total period of time beginning with the date of manufacture, cure, assembly, or pack (subsistence only), that an item may remain in the combined wholesale (including manufacturer's) and retail storage systems, and still remain usable for issue and/or consumption by the end user.

Each item that meets the shelf-life criteria is assigned a National Stock Number (NSN) and a specific shelf-life code. Typical shelf-life items include food, medicines, batteries, paints, sealants, adhesives, film, tires, chemicals, packaged petroleum products, hoses/belts, mission-critical o-rings, and Nuclear/Biological/Chemical equipment and clothing.

The Shelf-Life code identifies the shelf-life time period by which an item must be used, or subjected to inspection/test/restoration or disposal action. These codes are identified in Appendix A of the DoD 4140.27-M, and consist of two types, Type I and Type II. Type I is an individual item of supply which is determined through an evaluation of technical test data and/or actual experience, to be an item with a definite non-extendible period of Shelf-Life, and ends with the expiration date. Type II is an individual item of supply having an assigned shelf-life time period that may be extended after completion of inspection, test, or restorative action, and is identified by an inspection/test/date.

The policies for optimizing shelf-life materiel are contained in [DoD 4140.27-M, Shelf-Life Management Manual](#), as authorized by DoD Directive 4140.1, Materiel Management Policy. This policy provides for the supply chain (life-cycle management) of standard and hazardous shelf-life items contained in the federal supply system.

Announcements

POSTPONED

The 18th Annual Government - Industry Shelf Life Symposium scheduled for May 9-11, 2011 in San Diego Convention center, CA has been postponed. The Shelf Life Board is working on details and new dates will be announced soon.

Train the Trainer Class
The next class will be held Dec 6-8 2011, 0830-1630 in Naval Support Activity (NSA), Mechanicsburg, PA, Building 312, Conference Rooms R1-R2
[Register today!](#)

Privatization of Packaged Petroleum, Oil, Lubricants and Chemicals

The new combined MQCSS and QSL search page is [now online!](#)
Now with FLIS data. [Click here](#) for an overview of the new features.

New Avery templates for Shelf-Life Forms

Done

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MQCSS/QSL Search

DoD Shelf-Life Program Intranet - SLES Search - Windows Internet Explorer provided by NEC, Fort Leonard Wood, MO

https://headquarters.dla.mil/j-3/shelflife/sles/SLESSearchExt.aspx

DoD Shelf-Life Program Intranet - SLES Search

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Combined MQCSS / QSL Search

Tip: Use the optional * for wildcard searches. (ex: "9*" or "9" return all values that begin with 9).
[More search tips](#) | [New features overview](#) | [Feedback Tracking](#)

Database: ☒ MQCSS ☐ QSL Category: NSN Value: Search

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MCQSS/QSL Search (cont'd)

DoD Shelf-Life Program Intranet - SLES Search - Windows Internet Explorer provided by NEC, Fort Leonard Wood, MO

https://headquarters.dla.mil/j-3/shelflife/sles/SLESSearchExt.aspx

DoD Shelf-Life Program Intranet - SLES Search

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Tip: Use the optional * for wildcard searches. (ex: "9*" or "9" return all values that begin with 9).
[More search tips](#) | [New features overview](#) | [Feedback Tracking](#)

Database: ☒ MCQSS ☐ QSL Category: **NSN** Value: **9150009359807** Search

MCQSS search for '9150009359807*' in category 'NSN' returned 1 record(s). [Export](#) [Print](#)

Display 10 per page Page 1 of 1: 1

NSN	Item Name	SOS/CD
9150009359807	HYDRAULIC FLUID,PETROLEUM BASE	SMS

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Search Results

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DoD Shelf-Life Program Intranet - SLES Search

MQCSS Data

Print

National Stock Number: **9150009359807**

Approved Item Name: **HYDRAULIC FLUID,PETROLEUM BASE**

Defect Characteristics Code: **A6 B8 D3 D9 H1**

Hazardous Characteristics Code: **V6**

SL Code: **SLC Challenge** **6**

First Inspection Month: **015** Inspection Type Code: **V, L** Shelf-Life Type: **II**

Inspection Level Code: **T1** Reinspection Months: **015** Shelf-Life Month: **24**

Acceptable Quality Level: **6.5** Inspection Limit: **1** Source of Supply Code: **SMS**

Item Type Storage Code: **Hazardous Materiel Code:**

Resources: [HMIRS website](#)

Technical Publications: **MIL-PRF-6083**

Laboratory Remarks:

Remarks:

Record Last Updated: **1/25/2006 8:30:21 AM**

Hazardous Materiel Code - A code denoting material which requires special handling. It is used as a qualifier following the national motor freight classification and the uniform freight classification number. See Volume 10, Table 49 and quick info on-line.

QSL Data for NSN: 9150009359807

Noun	Contract Number	Lot/ Batch	Spec	Date Manuf.	Last Test	Test Due	Cond. Code	Issue To	SoS	Lab Code	Last Update
HYDRAULIC FLUID	450-00-D-0407	018	MIL-PRF-6083		122006		H	DRMO			1/22/2007
	406-06-D-0151	44894	MIL-PRF-6083		012008	000000	H	DRMO		WPA	2/1/2008
HYDRAULIC FLUID, PETRO BASE, FOR PRESV AND OPERATION	SP045000D0407	3672	MIL-PRF-6083F		052010	052012	A	ALL	S9G	POE	5/26/2010
Hydraulic Fluid	SPM4AR-07-D-000: 1/2	09P113	MIL-PRF-6083		092010	092012	A	ALL	S9G		9/17/2010
HYDRAULIC FLUID	SPM4AR07D0001/2/3/4/	57251	MIL-PRF-6083		082011	082013	A	ALL	S9G	STL	9/2/2011

Cancel

https://headquarters.dla.mil/j-3/shelflife/sles/terms.htm#HazMatCode

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Shelf-Life Extension Labels

SHELF- LIFE EXTENSION NOTICE

PER DOD 4140.27- M, CONTAINERS REQUIRE RE- MARKING WITH EXTENDED SHELF-
LIFE DATA.

UNITS OF ISSUE REQUIRE RE- MARKING UPON OPENING CONTAINER.

NSN: 9150-00-035-9807
SP045000D0407

3672
07/2008

CONTRACT NUMBER: 07/2010
QSL

LOT/ BATCH NUMBER: John Smith

DATE TESTED: _____

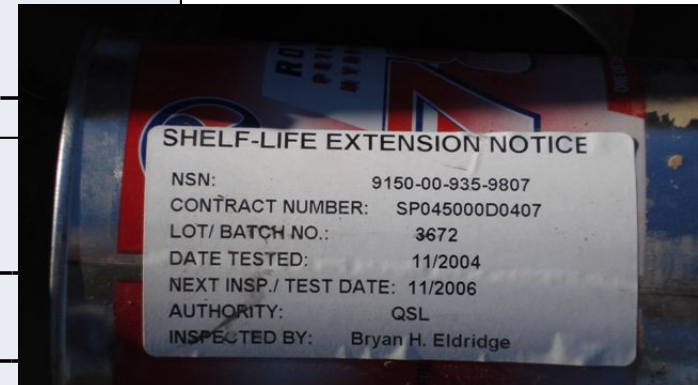
NEXT INSP/ TEST DATE: _____

AUTHORITY: _____

(QSL, MQCSS, OTHER)

INSPECTED BY: _____

(ACTIVITY AND INSPECTOR'S NAME OR



Check on Learning

- What is the purpose of the Shelf-Life Program?
- What does a numeric shelf-life code designate?
- Where can you find shelf-life extension information?

Learning Objective 3

- Identify the components of Hazard Communication (HAZCOM)



Hazardous Chemicals

- A Hazardous Chemical is any element, chemical compound or mixture of elements and/or compounds which is a physical or health hazard.

HAZCOM Program

- The HAZCOM Program is an OSHA requirement
- Managed by the Safety Office
- Must be a written program maintained at the main work place and available to all on request
- Must contain:
 - A list of hazardous chemicals known to be present
 - Methods used to inform employees of the hazards
 - Methods used to inform employees of protective measures
 - Methods used to inform employees of the labeling system

HAZCOM Program (cont'd)

- A good HAZCOM program should include measures to safeguard employee health and physical safety when using hazardous chemicals. These measures include:
 - Product Substitution
 - Engineering Controls
 - Safe Work Practices
 - Personal Protective Equipment
 - Training and Communication
 - Environmental Monitoring
 - Personnel Monitoring



Labeling System

- All labels on containers of hazardous chemicals will be:
 - Legible
 - In appropriate languages of the users
 - Prominently displayed on the container
- All labels will contain:
 - The identity of the chemical as it appears on the MSDS
 - Appropriate hazard warnings
 - The name and address of the chemical manufacturer

Unit-level HAZCOM Responsibilities

- Provide a HAZMAT inventory to the Safety Office for inclusion in the written HAZCOM program, update as changes occur
- Conduct HAZCOM training as required
- Maintain MSDS for all HAZMAT used/stored on site
- Ensure Soldiers follow established safety procedures and use appropriate PPE
- Ensure labeling system is applied and followed
- Ensure Soldiers know:
 - The location of the written HAZCOM program
 - Where hazardous chemicals are stored/used
 - Where to find and how to read MSDS

HAZCOM Training

- New on job
- New chemical introduced to job site
- Annual refresher
- Training should be documented and maintained within the unit's record



Material Safety Data Sheets

- Required by OSHA. Developed by chemical manufacturers. Conveys both the physical (pH, flashpoint, flammability, etc.) and health hazards (carcinogenicity, teratogenicity, etc.) of chemicals manufactured and distributed.
 - Must provide specific information on the identities, properties and hazards of chemicals in the workplace.
 - Required to be maintained for every hazardous chemical on site.
 - Must be available for employee review or use.
 - Must be supplied by manufacturer or distributor.
 - Available through DLA Hazardous Material Information Resource System.



Obtaining an MSDS

MATERIAL SAFETY DATA SHEET		
SECTION 1		NAME & PRODUCT
Chemical Name: Acrylonitrile	Catalog Number: AX0350	
Trade Name & Synonyms: Vinyl Cyanide	CAS #107-13-1	Chemical Family: Nitrile
Formula: CH ₂ :CHCN	Formula Weight: 53.07	

Every hazardous material in inventory will have a MSDS. If it is missing:

- Check with supply
- Call the manufacturer or check their website
- Use the DLA Hazardous Material Information Resource System (HMIRS),
<http://www.dlis.dla.mil/hmirs/>
- Request assistance from the Installation Environmental Office or MACOM environmental officer

MSDS Sections

- Product and Company Information
- Hazard Identification
- Composition / Information on Ingredients
- First Aid Measures
- Fire Fighting Measures
- Accidental Release Measures
- Handling and Storage
- Exposure Controls / Personal Protection
- Physical and Chemical Properties
- Stability and Reactivity
- Toxicological Information
- Ecological Information
- Disposal Considerations
- Transport Information
- Regulatory Information
- Other Information

PRODUCT AND COMPANY INFORMATION

- This section:
 - Names the material
 - Links the MSDS to the product label and shipping documents
 - Provides the manufacturer's information
 - Provides an emergency contact number



HAZARD IDENTIFICATION

- Should include:
 - Emergency overview
 - Physical state
 - Hazards that require immediate attention in emergencies
 - OSHA regulatory status
 - Potential health effects
 - Symptoms associated with exposure
 - Potential environmental effects
 - Potential effects associated with a release into the environment.



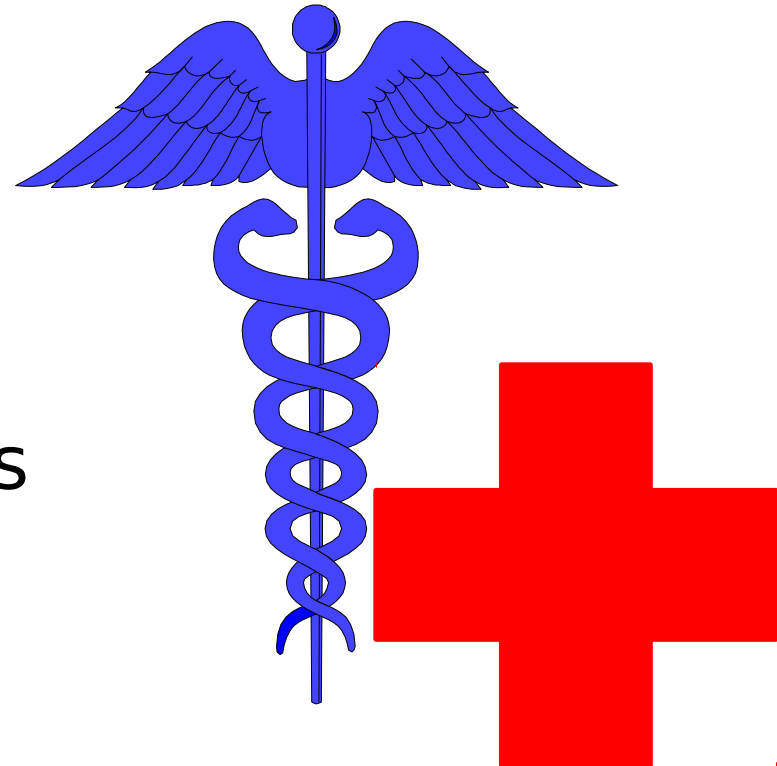
COMPOSITION / INFORMATION ON INGREDIENTS



- The MSDS must list the chemical name of all hazardous ingredients which make up more than 1% of the material. Carcinogens will be listed if their concentration is .1% or greater.
- This section may include toxicological data on the ingredients listed.

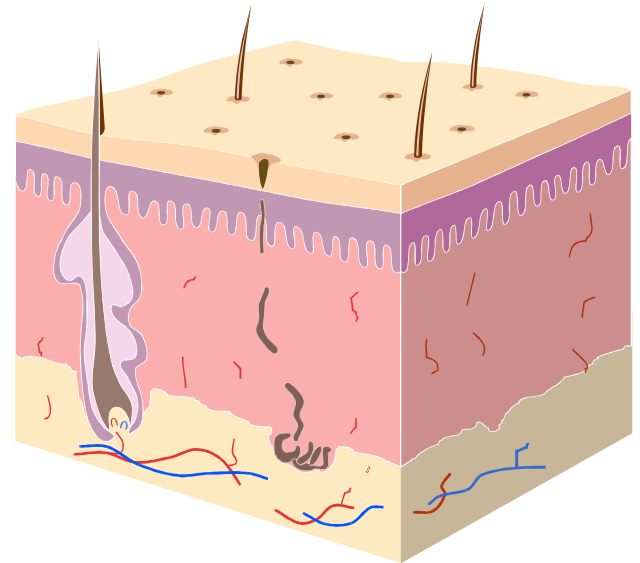
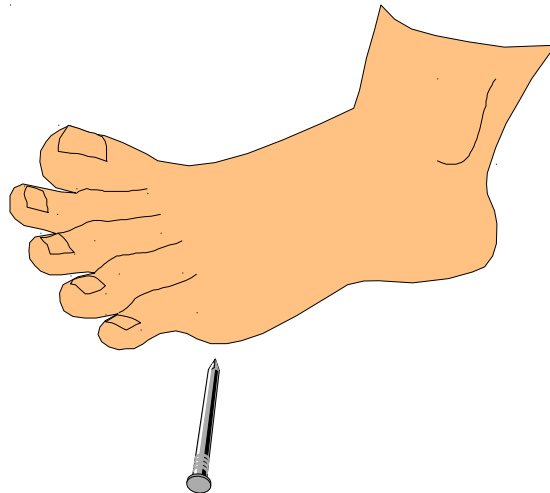
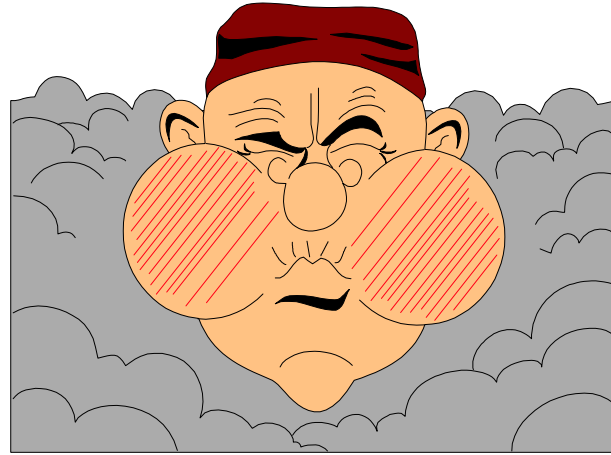
FIRST AID MEASURES

- Should include:
 - First aid procedures
 - Measures to be taken based on the route of exposure
 - Notes to physicians
 - Antidotes
 - Specific treatments
 - Diagnostic procedures



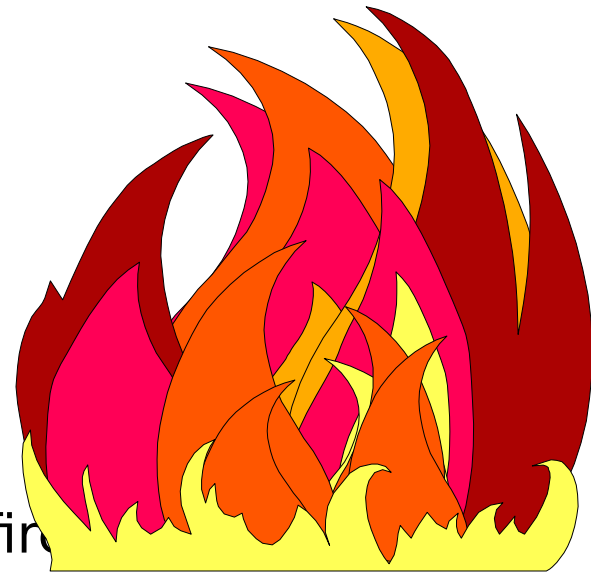
Routes of Entry

- Inhalation
- Absorption
- Injection
- Ingestion



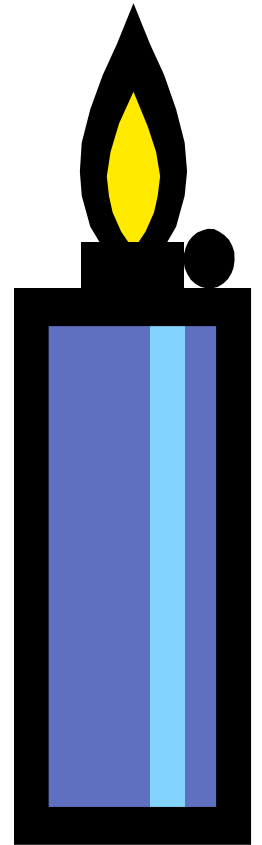
FIRE-FIGHTING MEASURES

- Fire-fighting measures to protect lives
- Special environmental warnings such as toxicity of water runoff (if applicable)
- Fire and explosive properties
- Appropriate extinguishing media
- May also include:
 - Flash point, UEL/LEL
 - Flammability classification
 - Hazards of combustion products, etc.
 - Properties that may initiate or intensify fire
 - Potential for dust explosion
 - Reactions that release flammable gases or vapors
 - Fast burning characteristics
 - Release of invisible vapors



Flammability & Explosive Limits

- Lower Flammable Limit (LFL) is the leanest mixture of combustible gas and air that will sustain a flame.
- Upper Flammable Limit (UFL) is the richest mixture that will burn.
- Lower Explosive Limit (LEL) is the leanest mixture of combustible gas and air for the chemical to explode.
- Upper Explosive Limit (UEL) is the richest mixture of combustible gas and air for the chemical to explode.

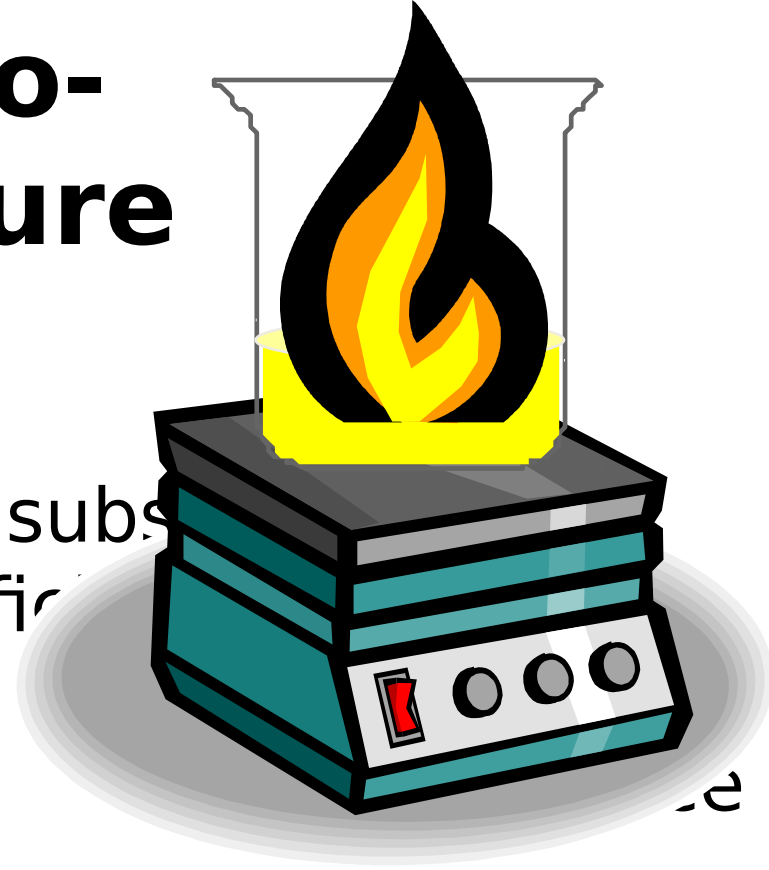


Flashpoint & Auto-Ignition Temperature

- Flashpoint is the minimum temperature at which a substance produces sufficient vapor to

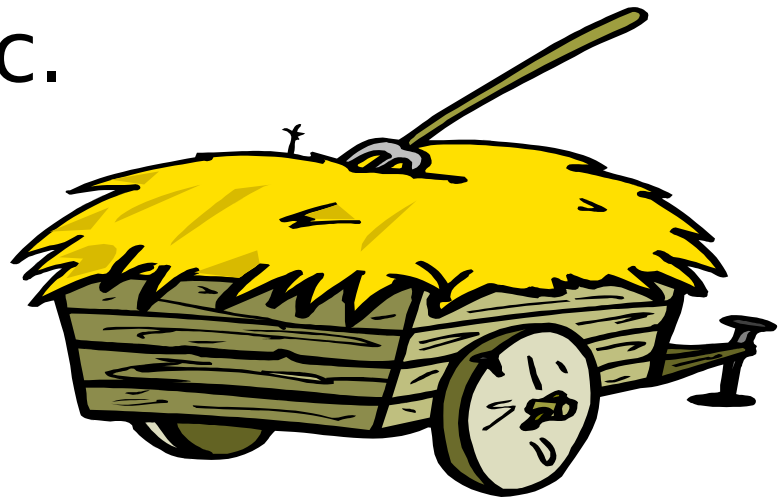
ignite in the presence of an ignition source.

- Auto-ignition temperature is the minimum temperature when something will burn without an ignition source.



Spontaneous Combustion

- Typically occurs when heat produced by slow oxidation causes a fire.
- Happens when heat cannot dissipate into the environment.
- Examples include: Oily rags, wet hay, discarded tires, etc.



Fire Extinguishers



- It is vital to know what type of extinguisher is needed. Using the wrong type can be life-threatening.
- **Class A** - ordinary combustible materials such as paper, wood, cardboard, and most plastics (produces **Ash**) The numerical rating indicates the amount of water it holds and the amount of fire it can extinguish.
- **Class B** - flammable or combustible liquids such as gasoline, kerosene, grease and oil. The numerical rating indicates the approximate number of square feet of fire it can extinguish.
- **Class C** - electrical equipment, such as appliances, wiring, circuit breakers and outlets. No numerical rating. The C means the extinguishing agent is non-conductive. Do not use water on a Class C fire.
- **Class D** - combustible metals, such as magnesium,

Other Extinguishers



- Water or APW (air-pressurized water) extinguishers suitable for class A fires only.
- Dry chemical extinguishers are suitable for a combination of class A, B & C fires. Foam or powder filled and pressurized with nitrogen.
 - BC: Filled with sodium or potassium bicarbonate. Leaves a mildly corrosive residue which must be cleaned immediately.
 - ABC: Filled with monoammonium phosphate. Leaves a sticky residue that may be damaging to electrical appliances.
- Carbon Dioxide (CO₂) extinguishers are used for class B and C fires. They contain carbon dioxide and are highly pressurized.
 - They don't work very well on class A fires because they may not be able to displace enough oxygen to put the fire out, causing it to re-ignite.
 - CO₂ extinguishers have an advantage over dry chemical

ACCIDENTAL RELEASE MEASURES

- Contains information for responding to spills, leaks, or releases.
- Containment techniques
- Cleanup procedures
- Equipment and other emergency advice to spills and releases.



Respirators



- Air Purifying Respirators include:

- Air Purifying Disposable Particulate Masks
- Air Purifying Half Mask Respirators
- Air Purifying Full Face Mask Respirators
- Gas Masks
- Powered Air Purifying Respirators



- Supplied Air Respirators include:

- Airline Respirators
- Emergency Escape Breathing Apparatus
- Self-Contained Breathing Apparatus (SCBA)



Emergency Response Levels

- **Level A** - To be selected when the greatest level of skin, respiratory, and eye protection is required.
- **Level B** - The highest level of respiratory protection is necessary but a lesser level of skin protection is needed.
- **Level C** - The concentration(s) and type of airborne substance are known and the use of air purifying respirators is sufficient to protect the worker.
- **Level D** - A work uniform affording minimal protection: used for non-hazardous contamination only.



EXPOSURE CONTROL / PERSONAL PROTECTION

- Controls needed to reduce risk of personnel exposure.
- PPE selection guidance for each route of exposure.
- PPE selection for an emergency.
- Engineering controls (e.g. exhaust systems).
- Work practices to reduce contact or exposure.

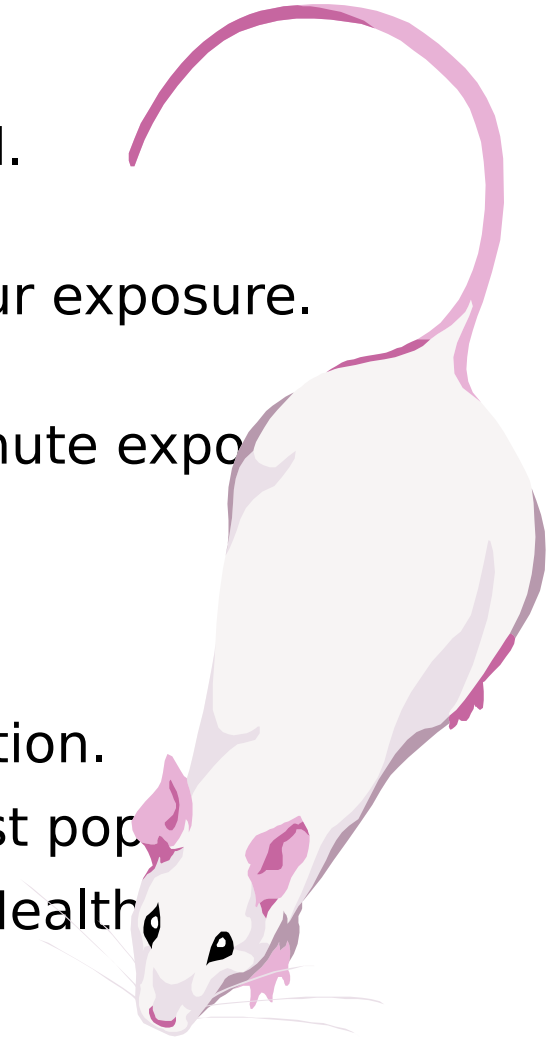
Exposure Limits & Terms

Exposure Limits:

- **REL** - Recommended Exposure Limit, NIOSH.
- **PEL** - Permissible Exposure Limit, OSHA.
- **TLV** - Threshold Limit Value, ACGIH for 8-hour exposure.
- **TWA** - Time Weighted Average.
- **STEL** - Short Term Exposure Limit for 15-minute exposure.
- **C** - Ceiling.

Exposure Terms:

- **LD₅₀** - dose that kills 50% of the test population.
- **LC₅₀** - concentration that kills 50% of the test population.
- **IDLH** - Immediately Dangerous to Life and Health.





Safety Glasses

- Most widely used type of eye protection.
- Stronger and more resistant to impact and heat than regular glasses.
- Equipped with side shields that provide protection from hazards that may not be directly in front of you.
- Both prescription and nonprescription available.
- A wide variety of lens coatings are available.
- Should be Z-87 approved.
- Contact lenses should not be worn during work.

Face Shields

- Face shields offer you full face protection and are often used around operations which expose you to molten metal, chemical splashes, or flying particles.
- Many face shields can be used while wearing a hard hat.
- NOTE: You should always wear safety glasses or goggles when using a face shield for added protection. Face shields alone are NOT considered adequate eye protection.

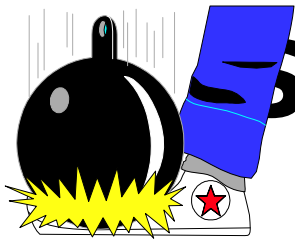


Protective Gloves

It has been estimated that almost 20% of all disabling accidents on the job involve the hands.

- Select and use the right kind of glove for the job you are going to be performing.
- Select gloves that fit.
- Some gloves may be chemical specified and have a life expectancy. Discard them after the recommended time has expired.
- Remove any rings, watches, or bracelets that might cut or tear your gloves.
- Wash your hands before and after wearing your gloves.
- Inspect your gloves before you use them. Look for holes and cracks that might leak.





Safety & Chemical Footwear



- Safety footwear:
 - Steel toe footwear protects your toes from falling objects and from being crushed.
 - Metatarsal footwear have special guards that run from your ankle to your toes and protect your entire foot.
 - Reinforced sole footwear have metal reinforcement that protects your foot from punctures.
 - Latex/Rubber footwear resists chemicals and provides extra traction on slippery surfaces.
- Chemical protective footwear:
 - PVC footwear protects your feet against moisture and improves traction.
 - Butyl footwear protects against most ketones, aldehydes, alcohols, acids, salts, and alkalis.
 - Vinyl footwear resists solvents, acids, alkalis, salts, water, grease, and blood.

Hard Hats



- Hard hats protect you by providing the following features:
 - A rigid shell that resists and deflects blows to the head.
 - A suspension system inside the hat that acts as a shock absorber.
 - Some hats serve as an insulator against electrical shocks.
 - Shields your scalp, face, neck, and shoulders against splashes, spills, and drips.
 - Some hard hats can be modified so you can add face shields, goggles, hoods, or hearing protection to them.
- Types of hard hats:
 - Class C hard hats protect you from bumping against fixed objects. DO NOT protect you from falling objects, electrical shocks, or corrosive substances.
 - Class G hard hats are designed to protect you from falling objects and electrical shocks up to 2,200 volts.
 - Class E hard hats are designed to protect you from falling objects and electrical shocks up to 20,000 volts.

Hearing Protection

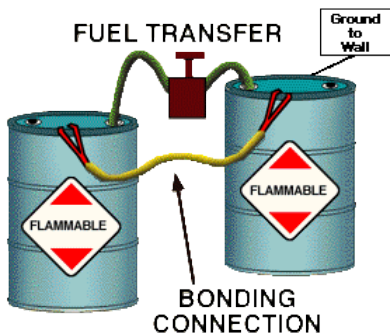
- You should wear a hearing protection device whenever you are exposed to noise that is 85 decibels or greater for an 8-hour period of time.





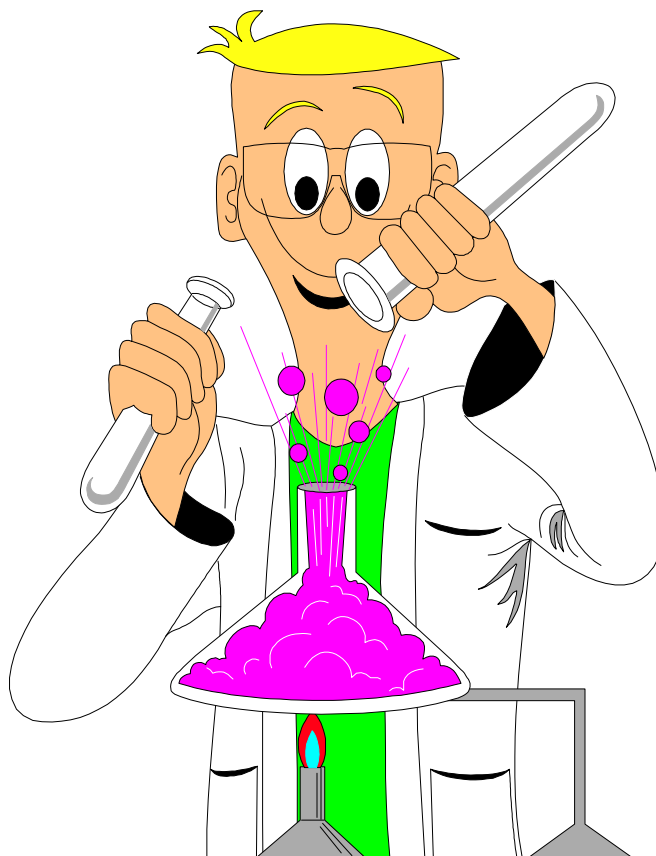
Engineering Controls

- Ventilation Systems
- Monitoring Systems
- Drum funnels with hinge lids
- Separate drain systems
- Grounding
 - It is important to recognize activities that generate static electricity as it can ignite flammable vapors

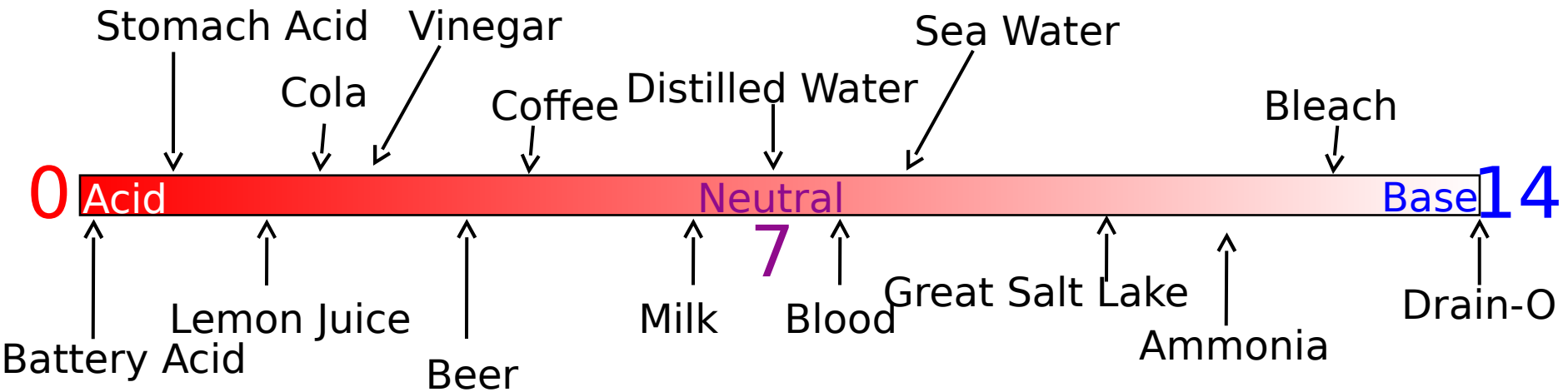


PHYSICAL AND CHEMICAL PROPERTIES

- Basic Description
- pH
- Vapor Pressure
- Vapor Density
- Boiling Point
- Solubility in water
- Specific gravity



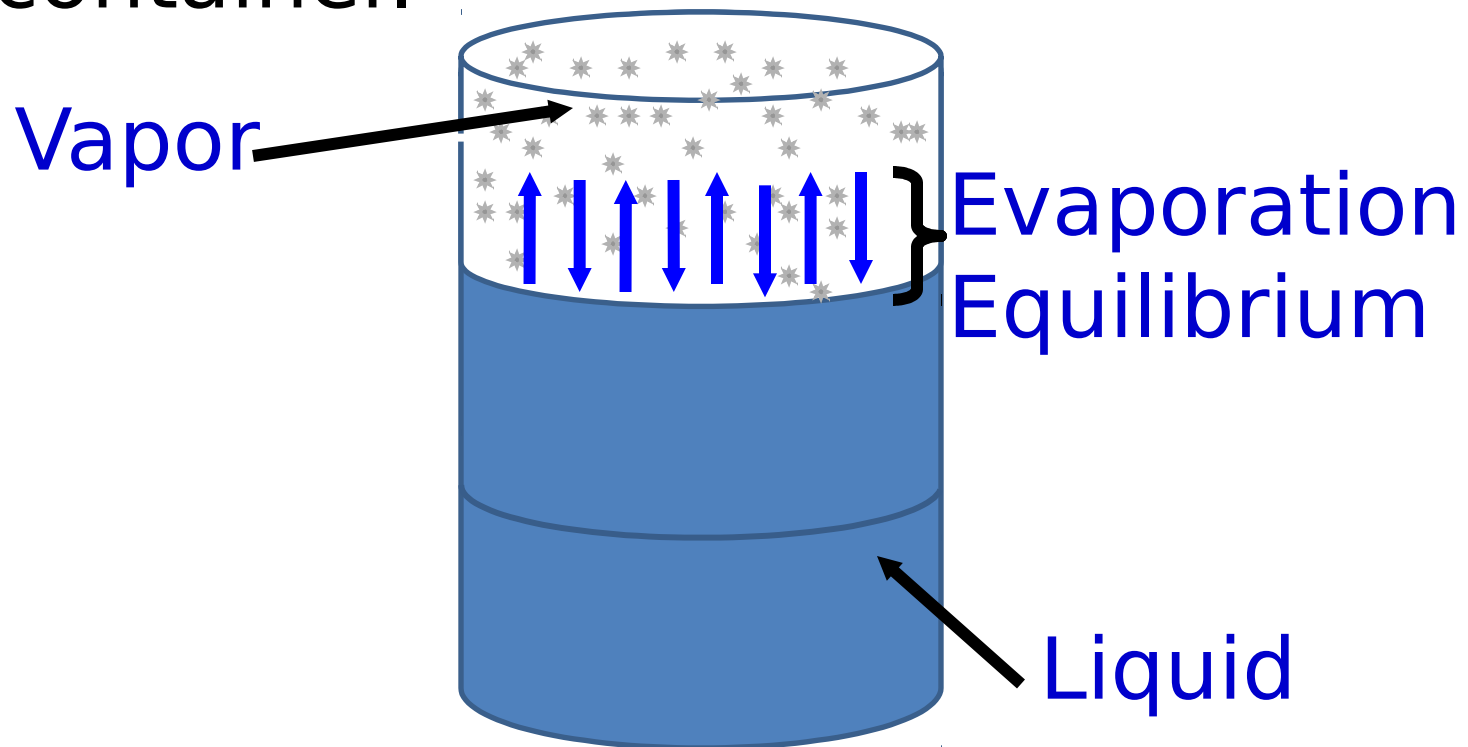
The pH Scale



- The pH scale measures the relative strength of acids and bases (how corrosive a solution is).
- Corrosives may be bases ($\text{pH} > 7$) or acids ($\text{pH} < 7$)
- Pure water has a $\text{pH} = 7$

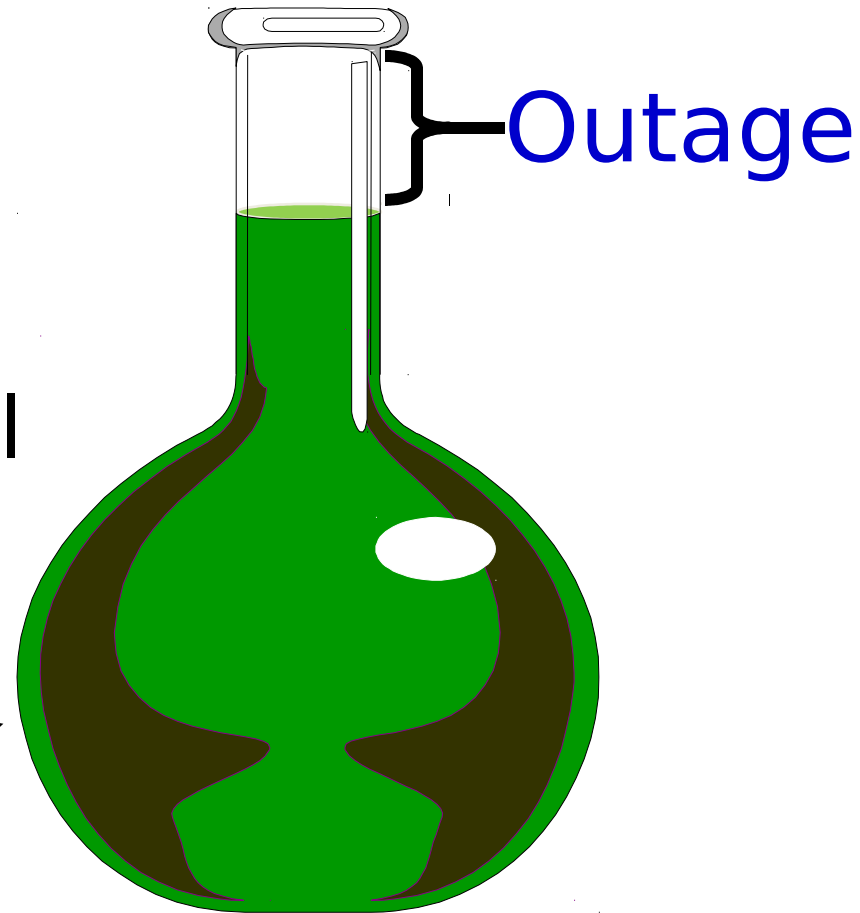
Vapor Pressure

- The pressure exerted by a vapor against the sides of a closed container.

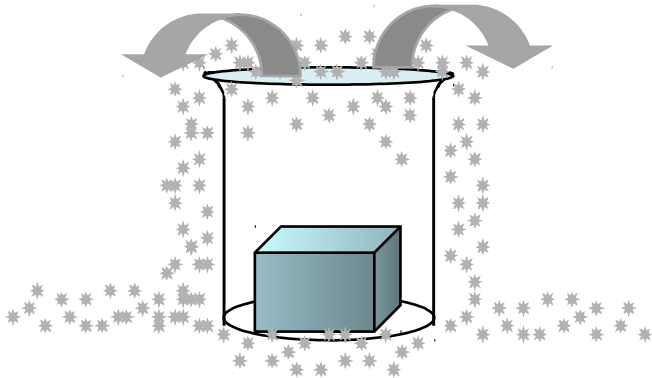


Outage (Ullage)

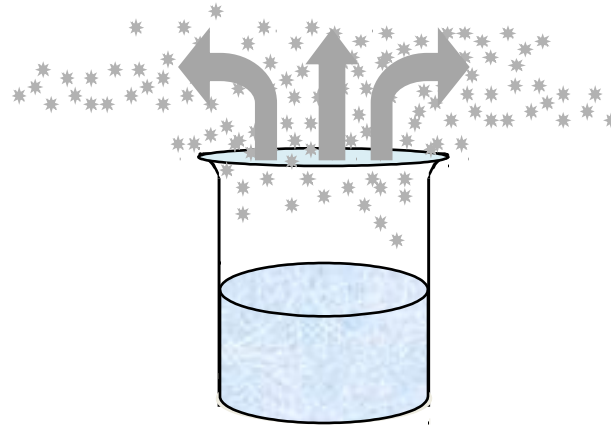
- The space that needs to be left between a chemical and the top of the container to allow for expansion and contraction.



Vapor Density



Dry Ice
(carbon dioxide)
vapor density > 1.0



Ammonia
vapor density < 1.0

- Gas or vapor density relative to the density of the ambient atmosphere.
- Vapor density of dry air = 1.0.

Boiling Point

- The temperature of a liquid when the vapor pressure equals atmospheric pressure at the liquid surface.
- The temperature when a liquid changes to a gas.
- 212°F (100°C) for water.



Solubility

- The ability or tendency of one substance to blend or dissolve uniformly into another.
- Materials that dissolve readily are referred to as miscible.
- Materials that do not dissolve are referred to as immiscible.

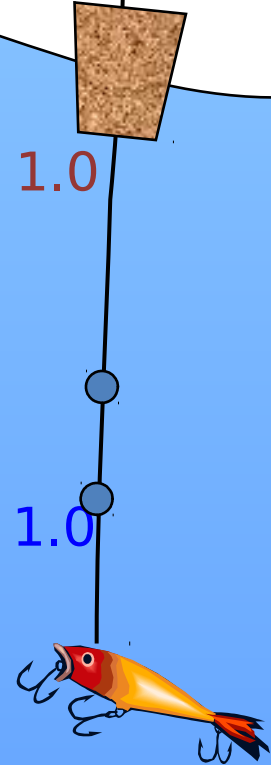


Specific Gravity

- A relative measure comparing the density of a liquid or solid to the density of water at its densest, at 4^o C.
- S.G. of water = 1.0.

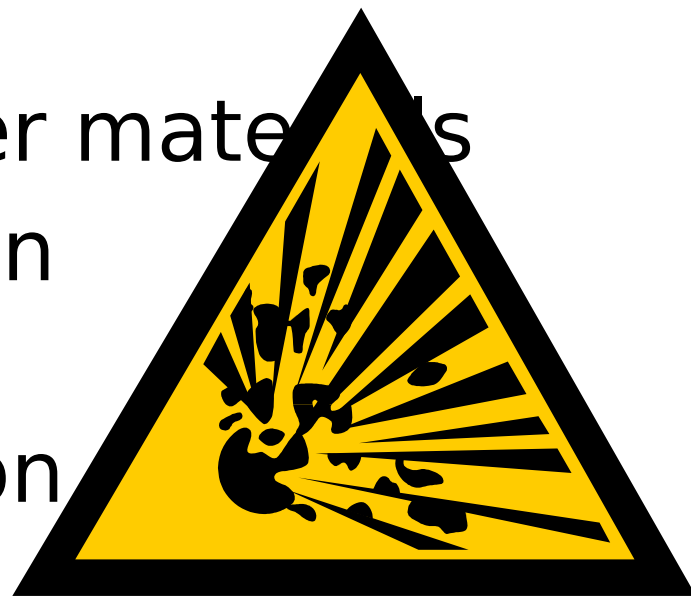
Cork
Specific Gravity < 1.0

Lead Sinkers
Specific Gravity > 1.0



STABILITY AND REACTIVITY

- Describes conditions that could result in a potentially hazardous chemical reaction.
- Chemical stability
- Conditions to avoid
- Incompatibility with other materials
- Hazardous decomposition products
- Hazardous polymerization



Chemical Reactions of Incompatibles

<u>Hazard</u>	<u>Chemical Reaction Example</u>
Generation of heat	Acid and water
Fire	Hydrogen sulfide and calcium hypochlorite
Explosion	Picric acid and sodium hydroxide
Toxic gas or vapor production	Sulfuric acid and plastic
Flammable gas or vapor production	Acid and metal
Formation of a substance with greater toxicity than the reactants	Chlorine and ammonia mixed together form the hazardous gas, chloramine
Pressurization of closed vessels	Fire extinguisher
Solubilization of toxic substances and Chromium	Hydrochloric acid
Violent polymerization	Ammonia and acrylonitrile

Reactive Materials

- A reactive material is one that can undergo a chemical reaction under certain specified conditions. The following are some examples of reactive materials:
 - Oxidants
 - Organic peroxides
 - Water reactives
 - Pyrophoric materials



Oxidants / Organic Peroxides / Pyrophoric Materials

- Oxidants spontaneously release oxygen. They are extremely heat and flame sensitive, may provide oxygen during a fire causing a more intense burn. Examples are: chlorates, chlorites, nitrates, nitrites, permanganates, peroxides and persulfates.
- Organic peroxides are a type of oxidizer that can be shock/heat sensitive, flammable, and potentially explosive. Examples are: Benzoyl peroxide, Methyl ethyl ketone peroxide, and Peroxyacetic acid.
- Pyrophoric materials are capable of igniting spontaneously when exposed to moist or dry air at or below 130° F. They will also ignite in air at or below normal room temperatures in the absence of added heat, shock, or friction. An example is white phosphorus.



Water Reactive Materials

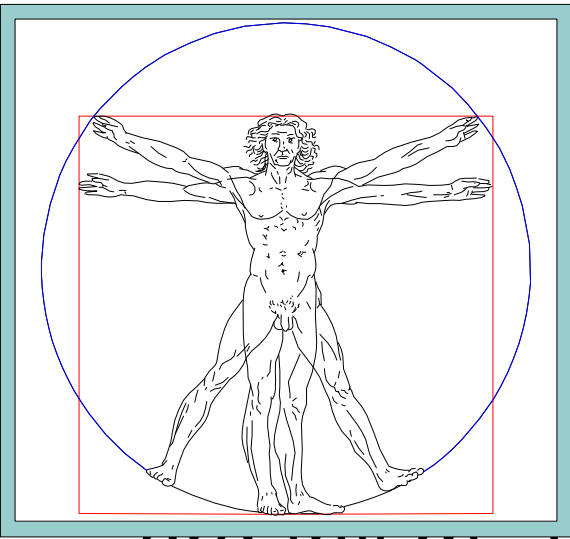
- These reactive materials are usually flammable solids that will react in varying degrees with water or humid air.
- Examples are:
 - Calcium carbide
 - Metallic sodium



TOXICOLOGICAL INFORMATION

Toxicity is the ability of a substance to damage an organism. The severity will vary with the dose, route of entry, exposure, resistance, and synergism.

- Should included:
 - Existing toxicity to animals
 - Potential chronic effects
 - Potential toxic effects
 - Organ systems effected



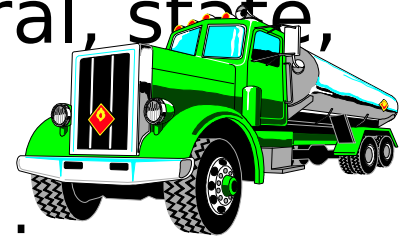
ECOLOGICAL INFORMATION

This section will contain information regarding how the material will potentially affect the ecosystem.

- Toxicity to fish and water insects
- Potentially hazardous products of biodegradation
- Biochemical Oxygen Demand
- Chemical Oxygen Demand

DISPOSAL CONSIDERATIONS / TRANSPORT INFORMATION

Disposal consideration should include information necessary to the appropriate disposal of the product once it becomes a waste. However, it will generally state “waste must be disposed of in accordance with federal, state, and local regulations”.



The Transportation section will contain:

- Basic DOT description: HAZMAT description, proper shipping name, hazard class and Identification Number
- Other DOT requirements: Reportable quantities, modal restrictions, special packaging, labeling, or exemptions
- Other international transportation information

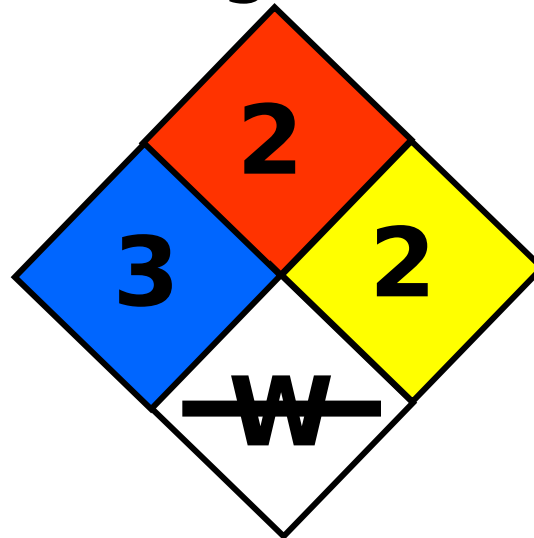
REGULATORY AND OTHER INFORMATION

This section will contain additional regulatory or other information that is necessary for proper use or handling of the material:

- Regulations that are specific to individual States
- Warnings of harm that are not universal but may be required by individual States
- Classifications or regulations that are specific to foreign countries.
- HMIS and NFPA classifications.
- References
- MSDS creation date or date last updated

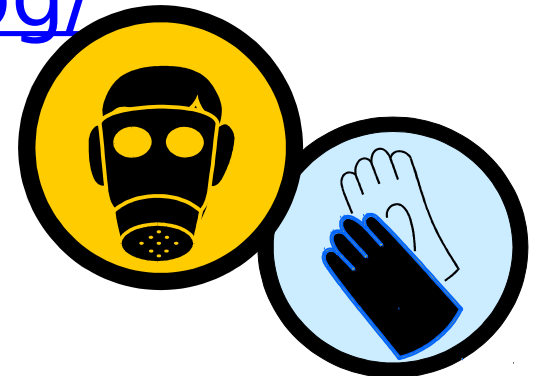
Fire Protection Guide on Hazardous Materials

- NFPA 704 Guidance.
- Hazardous properties of chemicals as related to Fire Prevention or response to fire emergencies.



NIOSH Pocket Guide to Chemical Hazards

- Information on 677 hazardous chemicals or groupings in common use in industry. Provides chemical and physical properties, exposure limits, respiratory and personal protective equipment (PPE) recommendations.
- <http://www.cdc.gov/niosh/npg/>



On-Line Training

- <http://www.free-training.com/osha/Soshamenu.htm>
- HAZCOM
- PPE
- Back Safety
- Hearing Conservation
- Forklift Safety



Check on Learning

- What must a written HAZCOM Program contain?
- When should HAZCOM training be conducted?

Check on Learning

- _____ is the minimum temperature at which a substance produces enough vapors to ignite in the presence of an ignition source.
- A MSDS is required by _____ for _____ hazardous material stored or used on site.

Learning Objective 4

- Identify HAZMAT transportation requirements.



Unit Movement Officer

- The Unit Movement Officer manages and controls the flow of Army Transportation during unit movement operations.
 - Officer or senior NCO (E-6 or above)
 - Assigned on additional duty orders
 - Complete Unit Movement Officers/ TC-AIMS training courses
- Must be familiar with:
 - Identifying, labeling, segregation, documenting and moving HAZMAT
 - HAZMAT certification process
- Duties regarding HAZMAT:
 - Supervise development and execution of unit load plans
 - Coordinate training of unit personnel
 - Ensure authorized personnel available to handle/certify HAZMAT
 - Prepare packing lists

Hazardous Cargo Certifying Official

Each unit requires one individual that is trained to certify hazardous cargo.

- Should not be the UMO
- Must be trained at a DOD approved school
- Appointed on orders
- Responsible for:
 - Ensuring shipments are properly prepared, packaged, labeled and segregated
 - Personal inspection of shipments
 - Signing the HAZMAT documentation

Hazardous Materials Regulations (HMR)

- The primary goal of the HMR is the safety of the public and those whose occupation involves transportation of, or contact with, HAZMAT. The HMR are divided into 3 areas:
 - HAZMAT identification and hazard communication
 - Packaging requirements
 - Operational rules
- No person, individual or company may offer or accept a HAZMAT for transportation in commerce unless the material complies with the HMR.

HAZMAT Transportation

- Packaging, shipping, handling, and inspecting of HAZMAT is mandated by US and international laws.
- HAZMAT must be properly prepared and documented (TM 38-250) to include the total HAZMAT quantity and a certification statement stating it is properly classified, described, packaged, marked, and labeled.
- Only specially trained individuals have authority to certify HAZMAT for transportation.
- Contact the Installation Transportation Officer (ITO) or Movement Control Team (MCT) for assistance.

HAZMAT Employer / Employee

The HMR requires ALL HAZMAT employees to be trained to increase safety awareness and to reduce HAZMAT incidents. HAZMAT employers are required to train, test and certify their HAZMAT employees.

- A HAZMAT employer uses 1 or more employees to transport or cause HAZMAT to be transported or shipped. This includes any department or agency of the US.
- A HAZMAT employee:
 - Loads, unloads, or handles HAZMAT
 - Prepares HAZMAT for transportation
 - Is responsible for safety of transporting HAZMAT

DOT HAZMAT Training

- HAZMAT training ensures personnel:
 - Are familiar with the regulations
 - Are able to recognize and identify HAZMAT
 - Have knowledge of requirements applicable to their functions
 - Have knowledge of emergency response/self-protection measures and accident prevention methods/procedures
- HAZMAT training must include:
 - General awareness
 - Function specific training
 - Safety
 - Security awareness
 - Driver training for those operating a HAZMAT vehicle

Training Documentation

- Training must be conducted:
 - Within 90 days of employment/transfer to HAZMAT duties
 - Every three years thereafter
- Training records will include:
 - Name
 - Date of training
 - Training materials
 - Name and address of HAZMAT trainer
 - Written certification, and
 - Will be maintained for 3 years

Hazard Classes 1-3

Nine Classes of Hazardous Materials

Class 1: Explosives

Divisions: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



Class 6: Poison (Toxic) and Poison Inhalation Hazard

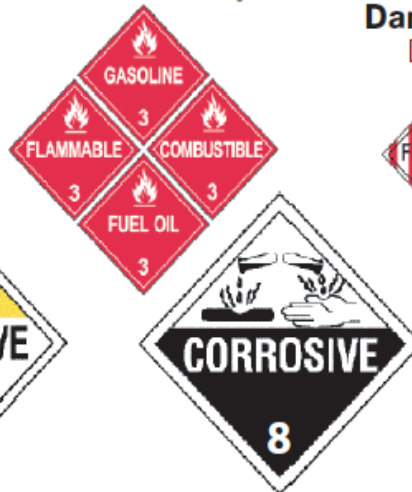
Class 2: Gases

Divisions: 2.1, 2.2, 2.3



Class 7: Radioactive

Class 3: Flammable Liquid and Combustible Liquid



Class 8: Corrosive

Class 4: Flammable Solid, Spontaneously Combustible, and Dangerous When Wet

Divisions 4.1, 4.2, 4.3



Class 9: Miscellaneous

Class 5: Oxidizer and Organic Peroxide

Divisions 5.1, 5.2



Dangerous

Revised 06/05



Hazard Classes 4-9

Nine Classes of Hazardous Materials

Class 1: Explosives

Divisions: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



Class 6: Poison (Toxic) and Poison Inhalation Hazard

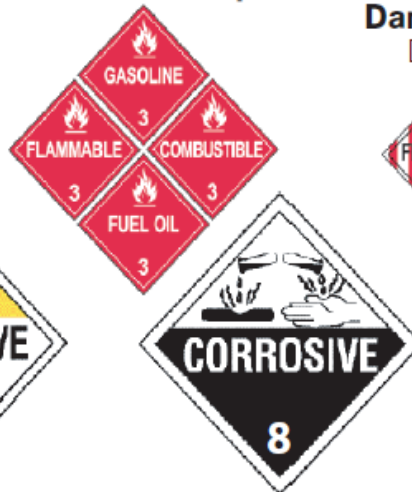
Class 2: Gases

Divisions: 2.1, 2.2, 2.3



Class 7: Radioactive

Class 3: Flammable Liquid and Combustible Liquid



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Divisions 4.1, 4.2, 4.3



Class 9: Miscellaneous

Class 5: Oxidizer and Organic Peroxide

Divisions 5.1, 5.2



Dangerous

Revised 06/05



Preparing & Documenting Shipments

Preparing a HAZMAT for shipping:

- Determine proper shipping name, hazard class, UN ID and packing group
- Determine mode of transportation
- Select proper packaging
- Select and apply proper labels
- Prepare packing lists
- Determine segregation requirements based on mode of transport
- Determine proper placards
- Load, block and brace HAZMAT
- Prepare shipping documentation
- Provide a Dangerous Goods declaration and certificate



Shipping Papers

Shipping papers are the documents which contain all required information on the HAZMAT being transported.

- Basic description (in this sequence)
 - Proper shipping name
 - Hazard class or division
 - ID number (column 4 of the HMT)
 - Packing group
- The hazards of the material
- An emergency response telephone number
- Total quantity with unit of measure
- Type of packaging and destination marks
- Specific information based on the HAZMAT being transported, i.e. radioactive material, marine pollutants, poisons, etc.
- Certification that the HAZMAT is properly offered for transportation
- Must be maintained for 1 year by shipper and carrier



Packaging

- The purpose is to assure that HAZMAT stay in the package during transportation.
- Packaging includes fiberboard boxes, drums, jerricans, portable tanks, cargo tanks, tank cars, etc.
- Packagings tested to meet regulatory performance requirements are called “UN Standard Packagings” and marked with the UN certification mark .
- Quantity and modal limitations must be

DOD Packaging

- HAZMAT offered for transportation by, for or to the U.S. Department of Defense (DOD) must be packaged:
 - According to the HMR or
 - In DOD-certified packagings of equal or greater strength and efficiency
- This rule includes commercial shipments under government contract.
- HAZMAT sold by DOD in packaging not marked according to the HMR must be certified in writing that it is equal to or greater than the HMR requirements.

Marking & Labeling

- Marking refers to the required information on outside of container



This includes a descriptive name, ID number, UN marks plus required instructions and/or cautions.

- A label is a prescribed hazard warning notice applied to the outside of shipping containers of HAZMAT. Labels identify the primary and subsidiary hazards and may give information

Markings

- Shipping paper proper shipping name requirements also apply to marking/labeling packages.
- All markings:
 - Must be durable
 - In English and printed on or affixed to the surface or on a label, tag or sign
 - Must stand out, located away from other markings and not obscured
- Markings will consist of:
 - Proper shipping name and description
 - Name and address of the consignee/consignor
 - Orientation arrows for combination packages /overpacks

Labels

- Labels must:

- Have a background of contrasting color or a dotted border
- 3.9 inches on each side, durable and weather resistant
- Not be obscured by markings or attachments
- Displayed next to each other when 2 or more labels are required
- On at least 2 sides or ends on each:
 - Package of overpack with a volume of 64 cubic feet or more
 - Non-bulk package of radioactive material
 - Freight containers with a volume of 64 to 640 cubic feet



Labels (cont'd)

- Required labels must be printed on or affixed near the proper shipping name.
- The label may be printed on, affixed to a tag or by other means when:
 - It contains no radioactive material and the label is larger than the package
 - The surface will not allow the label to be affixed
 - It is a cylinder
- A package containing a HAZMAT that meets the definition of more than one hazard class must be labeled for the additional hazard classes.
- A package containing more than one HAZMAT must be labeled for each hazard class.

Loading/Unloading Requirements

- There are general loading and unloading requirements:
 - Attendance requirements
 - Container safeguards
 - Accident/fire prevention
- There are specific loading and unloading requirements for specific materials/situations.
- Some HAZMAT must be segregated to prevent accident or incident.

Placarding

Each person shipping HAZMAT must comply with placarding requirements.

- Prohibitions:
 - Do not placard a vehicle/freight container unless it's carrying a HAZMAT
 - The hazard is correctly identified.
 - Use no color, shape or design that could be confused with

NOTE: Prohibitions do not apply to ID numbers displayed on white diamond shaped placards; Biohazard if the placard

the
Regulations or



Placarding Requirements

- Do not apply to:
 - Infectious substances
 - Limited quantities,
 - Other regulated materials (ORM-D)
 - Combustible liquids in non-bulk packaging
 - Materials prepared according to 173.13
- Display on each end and side of transport vehicles or freight containers loaded with HAZMAT
 - Readily visible from the direction it faces
- Shipper is responsible for supplying the required placards for highway transport vehicles



Placarding Requirements (cont'd)

- Placards must be:
 - Attached securely and in good condition
 - Located clear of appurtenances and devices
 - Clear of advertising, dirt and water, and doors, tarps, etc.
 - At least 3 inches from any detracting markings
 - Printed and displayed horizontally
- Be aware of any special requirements based on the HAZMAT being transported
- Keep/remove the placard on emptied bulk packaging until/when:
 - sufficiently cleaned and purged, or
 - reloaded with a non-regulated material or a

HMR Placarding Tables

Placarding Tables						Placarding Tables 172.504(e)		
§172.101 HAZARDOUS MATERIALS TABLE						TABLE 1		
Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	PG	Label Codes	Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
(1)	(2)	(3)	(4)	(5)	(6)			
D	Accelerene, see Nitrosodimethylaniline.					1.1	EXPLOSIVES 1.1	172.522
	Accumulators, electric, see Batteries, wet etc.					1.2	EXPLOSIVES 1.2	172.522
	Accumulators, pressurized, pneumatic or hydraulic (containing non-flammable gas).	2.2	NA1956	2.2		1.3	EXPLOSIVES 1.3	172.522
	Acetal	3	UN1088	II	3	2.3	POISON GAS	172.540
A	Acetaldehyde	3	UN1089	I	3	4.3	DANGEROUS WHEN WET	172.548
	Acetaldehyde ammonia	9	UN1841	III	9	5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled).	ORGANIC PEROXIDE	172.552
	Acetaldehyde oxime	3	UN2332	III	3	6.1 (inhalation hazard, Zone A or B)	POISON INHALATION HAZARD	172.555
	Acetic acid, glacial or Acetic acid solution, with more than 80 percent acid, by mass.	8	UN2789	II	8	7 (Radioactive Yellow III label only)	RADIOACTIVE *	172.556
	Acetic acid solution, not less than 50 percent but not more than 80 percent acid, by mass.	8	UN2790	II	8	*RADIOACTIVE placards also required for exclusive use shipments of low specific activity material and surface contaminated objects transported in accordance with § 173.427(s) of this subchapter.		
						TABLE 2		
						Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
						1.4	EXPLOSIVES 1.4	172.523
						1.5	EXPLOSIVES 1.5	172.524
						1.6	EXPLOSIVES 1.6	172.525
						2.1	FLAMMABLE GAS	172.532
						2.2	NON-FLAMMABLE GAS	172.528
						2.3	FLAMMABLE	172.542
						3	COMBUSTIBLE	172.544
						4.1	FLAMMABLE SOLID	172.546
						4.2	SPONTANEOUSLY COMBUSTIBLE	172.547
						5.1	OXIDIZER	172.550
						5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled).	ORGANIC PEROXIDE	172.552
						6.1 (other than inhalation hazard, Zone A or B)	POISON (None)	172.554
						6.2		
						8	CORROSIVE	172.558
						9	Class 9 (see § 172.504(j)(9))	172.560
						ORM-D	(None)	

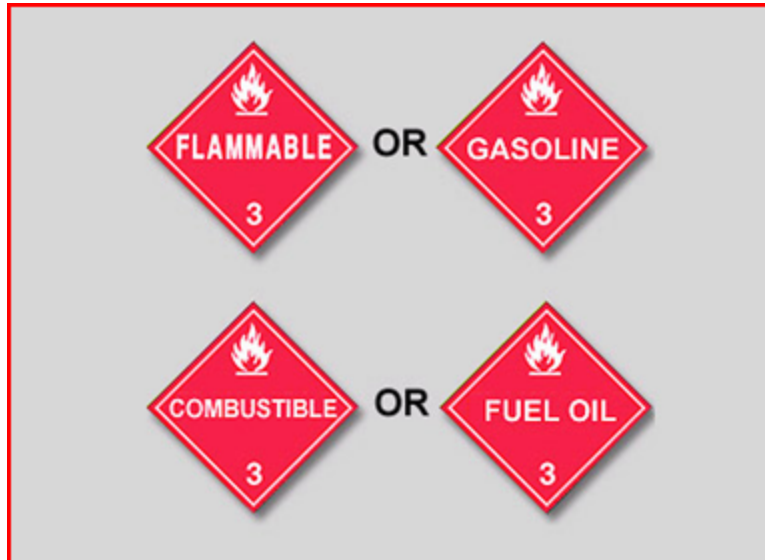
There are 2 Placarding Tables in the HMR. These Tables should not be confused with the Hazardous Materials Table.

Table 1 – Placard any quantity of any material listed.

Table 2 – Placard if aggregate gross weight is greater than 1001 pounds.

Placard Modifications

- Authorized modifications:
 - Gasoline in place of Flammable
 - Fuel Oil in place of Combustible
 - Poison and Toxic are interchangeable



HAZMAT Movement

The mode of transportation for HAZMAT will affect the requirements for packaging, marking, labeling and placards. Shipping modes include:

- Highway
- Rail
- Air
- Water-borne vessels

Check on Learning

- What responsibilities does the UMO have regarding HAZMAT?
- What must DOT HAZMAT training include?
- What HAZMAT falls under Hazard Class 1?

Check on Learning

- Who signs the HAZMAT documentation for a unit and for what else is this Soldier responsible?
- What is the difference between marking and labeling?
- What do the general loading and unloading requirements encompass?

Check on Learning

- For highway shipments, who is responsible for supplying the placards?
- True or False. The requirements for transporting HAZMAT are the same regardless of the mode of transportation.